Chemical Control of Geranium Growth and Flowering

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Geraniums are quite important in the economy of the floriculture industry, both in the state and nation. More North Carolina producers in 1984 had geraniums in their greenhouses (79) than any other crop (Table 1). Nationally bedding plant growers outnumbered geranium growers, but potted geraniums could be found at 656 more greenhouse firms than could poinsettias, and there were over twice as many geranium growers as potted mum producers. The popularity and prominence of geraniums make the crop worthy of some attention.

Table 1. Number of producers, units sold, and wholesale value of selected potted and bedding plants in 1984.

Crop	Number of producers		Number of units sold (X 1000)		Wholesale value of crops (X $1000)		Unit value $/sq.ft.	
	N.C.	U.S.	N.C.	U.S.	N.C.	U.S.	N.C.	U.S.
Chrysanthemums	49	1425	1,467	33,402	$4,636	$ 87,304	$4.69	$4.33
Easter lilies	29	1255	267	7,135	1,047	25,469	4.49	4.28
Geraniums	79	3042	1,553	70,940	1,941	65,250	3.98	2.83
Poinsettias	66	2386	1,753	31,253	5,610	105,714	2.17	2.34
Bedding plants								
Flowers	71	3738	1,245	38,390	6,661	209,074	3.59	3.28
Vegetables	65	3257	404	13,026	1,992	65,406	3.64	3.38

Data taken from Floriculture Crops. 1984 Summary. USDA Statistical Reporting Service. U.S. figures are for selected states, not all 50.

There really are two geranium categories to consider - those which are vegetatively propagated (zonal) and those which are started from seed. Two other categories - Pelargonium hortorum or Martha Washington geraniums and ivy-leaved geraniums - also are steadily gaining in popularity. A very good breeding program on Martha Washington geraniums is being conducted by Dr. Richard Craig and his colleagues at The Pennsylvania State University, and some new varieties might be suitable for warm areas in the U.S. including the Piedmont and Coastal regions of North Carolina.

Historically geraniums are somewhat difficult to analyze. William Scott's 1906 edition of The Florists' Manual tells about zonal, ivy-leaved, scented and Martha Washington geraniums. He describes the variety "Mrs. Pollock" as a great departure from any previous variety, and "Mrs. Pollock" apparently was introduced in the middle of the 19th Century. He also mentions other big improvements since the 1870's - better growth habit, improved flower form and color, just as we might describe recently introduced geranium varieties in 1986. Then you refer to White's excellent texts on the florist business and commercial flower crop production, published in

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1923 and 1933, and you will note that geraniums aren't even covered. Even Exacum is discussed in the third edition of the Ball Red Book, published in 1935, but geraniums are not among the crops listed. In the fifth edition (1941), the statement is made that "we are all aware of the value of the geranium as a bedding plant". The 14th edition (1985) really made us aware of the crop, as 16 pages were devoted to vegetatively propagated geraniums and 9 pages to seedling geraniums.

It is appropriate that vegetative and seedling geraniums be divided, as they really are two different crops both in culture and function. Growth regulators are used for both types, and no reference sums up the uses and rates better than the publication "Growth Regulators Effective on Floricultural Crops", authored by R. D. Heins, R. E. Widmer, and H. F. Wilkins (1978). Information on geraniums contained in that publication is presented here, along with an introductory statement that none of the growth regulators have EPA label clearance, and no responsible agency can recommend usage. Silver thiosulphate, used to reduce petal drop (shattering) on seedling geraniums, was not used when the publication by Heins et al was published, but it has received much publicity since then. It does not have label clearance, either.

It is unfortunate that greater efforts have not been made to get label clearance for effective, safe growth regulators on geraniums. In 1968 the George J. Ball Company and five university researchers made a coordinated effort to induce earlier flowering of plants in the Carefree series. N.C. State University personnel were involved, and Cycocel did accelerate flowering (Figures 1, 2, 3).

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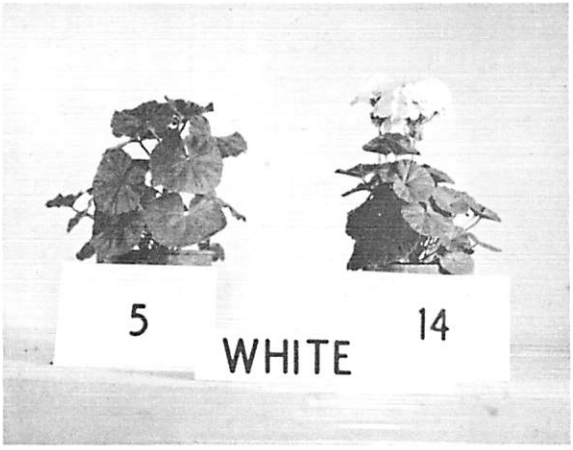

Figure 1. 'Carefree White' plants. Seed sown January 8, 1968. 5, Control; 14, Cycocel drench 1:40. Control plants flowered in 138 days, Cycocel-treated plants flowered in 105 days. Plants photographed May 7.

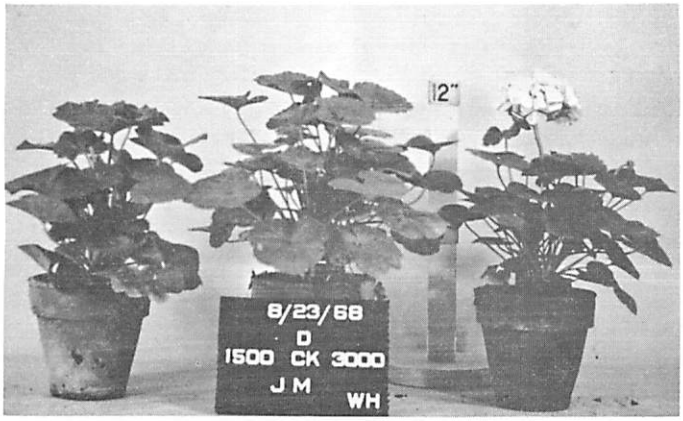

Figure 2. "Carefree White". Left to right; 1500 ppm Cycocel; Control; 3000 ppm Cycocel. Plants were grown in Jiffy Mix.

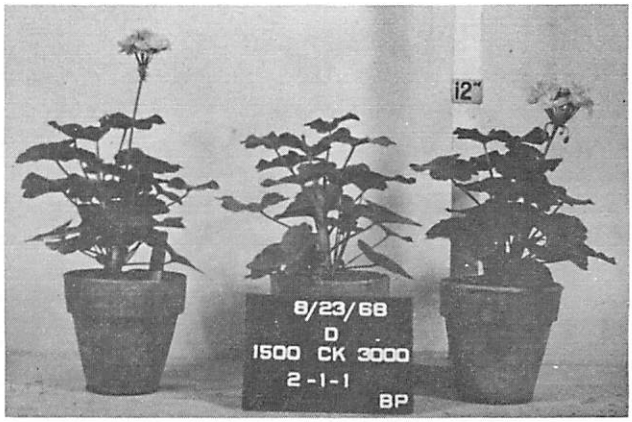

Figure 3. "Carefree Bright Pink". Left to right: 1500 ppm Cycocel; Control; 3000 ppm Cycocel. Medium was 2 parts loam soil, 1 part coarse sand, 1 part acid peat moss.

	Growth Regulator	Rate	Method of application	Mixing rates English	Mixing rates Metric	Time of Applications	Comments
Geranium -cuttings	Cycocel (Chlormequat) Height Control	2000 ppm (.2%)	Spray to wet foliage	2 oz/gal water	17 ml/L water	To control height, apply 2-3 wks after planting in 4" pots.	May cause leaf chlorosis on leaf margins.
	Gibberellic acid (GA_3) Stem elongation	250 ppm (.025%)	Spray (use wetting agent) to runoff	1 Gib-Tab/4 gal = 250 ppm 4 oz Pro-Gib/5 gal water 250 ppm	1 Gib-Tab/ 15L = 250 ppm 6.5 ml Pro-Gib/L = 250 ppm	Apply 4 sprays at weekly intervals to induce tree forms.	Elongating stem will need staking for support.
	Gibberellic acid (GA_3) larger, longer lasting blooms	1-5 ppm	Spray to wet foliage	1/8 Gib-Tab/ 26 gal = 5 ppm, 0.1-0.5 oz Pro-Gib/ 30 gal	1/8 Gib-Tab/ 100 L = 5 ppm, 1/5 ml Pro-Gib/8 L	Apply when a few florets in the inflorescence begins to show color. Earlier treatment can result elongation.	Inflorescence increase in size & can remain in marketable condition up to 2 wks longer. in excessive peduncle
Geranium -seedlings	Cycocel (Chlormequat) Height control; early flowering	200 ppm (0.2%)	Spray	2 oz/gal water	17 ml/L water	Apply at 4-5 true leaf stage. (May apply 1000 ppm at 2 wk intervals up to 4 times for early seed dates.	Plants flower about 7 days earlier.
	Florel (Ethephon) Height control	500 ppm (0.05%)	Spray	1.6 oz Florel/gal	13 ml Floral/L	Apply at 6-7 true leaf stage. May reapply 2-3 wks later.	Delays flowering 3-5 days. Very good for packs or closely spaced plants.
	Gibberellic acid (GA_3) Early flowering	5-15 ppm	Spray to runoff	0.5-1.5 oz Pro-Gib/30 gal	1-3 ml Pro-Gib/8L	Apply when flower buds 1st seem down in canopy.	Speeds flowering 10-21 days depending on cultivar.
	A-Rest (Ancymidol) Height control	200 ppm (0.18 mg/ plant)	Spray to just wet foliage. (about 1 ml/ plant)	96 oz A-Rest +water to make 1 gal	750 ml A-Rest + water to make 1 L	5-7 true leaf stage to control height.	Good for packs of closely spaced plants.

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The August, 1968 issue of Growers' Talks has pictures and quotations of people who participated. Everyone had success with Cycocel, especially on the variety 'Carefree White', but 18 years later we still don't have label clearance on this very successful growth regulator. A rumor has been circulated that clearance of a pesticide on one crop in a greenhouse can be transferred to another greenhouse crop. That interpretation is not correct. Cycocel clearance on poinsettias does not transfer to geraniums. Indiana, Ohio and Pennsylvania have applied for a Minor Use Label for Cycocel on geraniums and some perennials, so we might expect some activity soon.

Silver thiosulphate has been tried, to reduce petal drop, but it also lacks label clearance and can have undesirable effects on geraniums. We have predisposed treated geraniums to a Pythium problem (Figure 4), and similar results have been reported by researchers at Michigan State University.

Figure 4. Seedling geranium treated with silver thiosulphate (STS) to decrease petal abscission (shattering). We could report that the operation was successful but the plant died. STS reduced shattering; Pythium killed the plant.